

Alpha Magnetic Spectrometer - 02 (AMS-02) Critical Design Review

Avionics Integration Hardware Certification

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- Design Requirements
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- Requirements for Digi-Board & Intelligent Cable (COTS/OTS Commercial-Off-The-Shelf)

Design Requirements

- Conformance to
 - SSP 30242 Space Station Cable/Wire Design and Control Requirements for Electromagnetic Compatibility
 - Tech. Memo 102179 Selection of Wires and Circuit Protection Devices for NSTS Orbiter Vehicle Payload Electrical Circuits
 - SSP 30243, Space Station Requirements for Electromagnetic Compatibility

Processing Requirements

- Mandatory Inspection Points (MIPs) to verify critical operation during processing
- Critical operation tooling & test instruments certified and maintained by NASA/JSC Measurement Standards and Calibration Laboratory (MSCL)
- Acceptance Test 100% immediately following fabrication
- Visually inspect all cables for conformance to released drawing, physical damage, Cleanliness, sharp edges & workmanship
- Torque all connectors & accessories per drawings

Electrical Cables and Harnesses

- Build & assemble per NASA-STD-8739.4
 - **Crimping, Interconnecting Cables, Harnesses, and Wiring.**
- Perform Crimp Tensile Strength testing prior to crimping of flight contacts (a minimum of three successful test samples required)
- 100% point to-point electrical continuity test per wiring schematic
- 100% High Pot (Dielectric Withholding Voltage, DWV) tested all data & power cable with 1050 + 50 volts Root Mean Square (RMS), 60 Hz or 1500 + 75 Vdc.

Electrical Cables and Harnesses (Cont.)

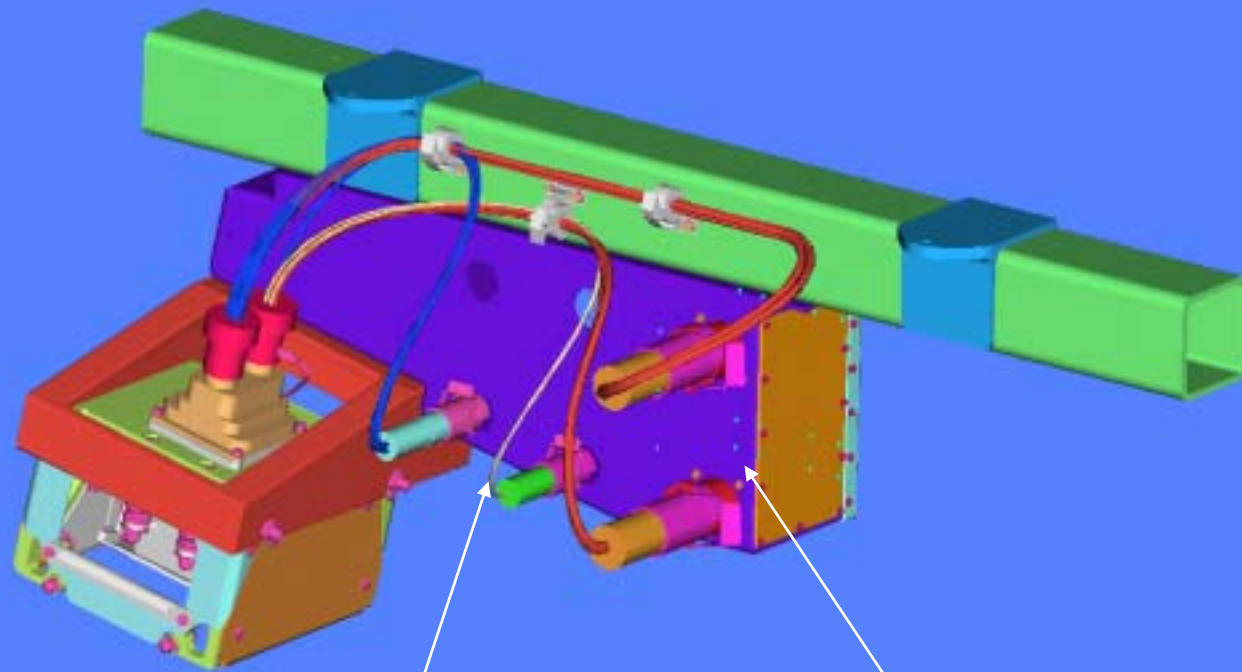
- 100% Insulation Resistance (IR) test all data & power cables with 500 +50Vdc.
- 100% Functional tested at system level
- Post Installation Test (prior to mating) will include continuity, DWV, and IR tests.

Typical Electrical Harness Construction

- Wire/Cable selected from MIL-W-22759, Teflon insulated
- Connectors selected from
 - 40M Series
 - SSQ 21635
 - MIL-DTL-38999
 - MIL-C-5015
- Spot tape cable bundles/wires together with Teflon tape
- All exposed Teflon wiring 100% covered with Acrylic adhesive back, Beta Cloth tape, Permacel P/N P-213
- Spot tie with lacing cord Bently Harris P/N HT-30TVS

Fiber Optic Cables

- Build & assemble per
 - NASA-STD-8739.5 Fiber Optic Terminations, Cable Assemblies and Installation.
 - SSQ 21635 Connectors and Accessories, Electrical, Circular, Miniature, IVA/EVA Compatible, Space Quality, G. Spec
 - SSQ 21654, Cable, Single Fiber, Multimode, Space Quality, G. Spec
 - Reinforce with rugged bend limiter to maintain minimum bend radius



Bend limiter

EVA Panel

Fiber Optic Cables (Cont.)

- 100% Functional tested at system level
- Optically Test with Optical Power Meter and Light Source after assembly
- Technician certified by NASA/JSC for optical cable assembly

Exceptions

- All data bus cable with bus coupler, Off-The-Shelf (OTS) intelligent data cable High Pot & IR test.

Requirements for Digi-Board & Intelligent Cable (COTS/OTS Commercial-Off-The-Shelf)

- Perform Detailed Workmanship Inspection
- Perform Temperature Cycling Test
- Perform Functional Test
- Perform Burn-in Test
- Meet Safety Requirements
 - Flammability :
 - » By conformal coating PC board with DC3140
 - » By wrapping cable with Teflon tape
 - EMI Emissions :- By test